

## REMARKS

The application has been thoroughly reviewed in light of the outstanding Office Action dated September 20, 2004. Claims 1, 2 and 6-8, 10-13, 15-23 and 25-38 are currently pending, with claims 1, 25, 33, 34, 35 and 38 being independent. Claims 3-5, 9, 14 and 24 have been canceled without prejudice and/or disclaimer of subject matter (claims 39 and 40 having been previously canceled). Claims 1, 11, 25, 30, 33-35 and 38 have been amended. No new subject matter has been added to either the specification or claims. Each of the points raised in the outstanding Action are addressed below.

### *Rejection of Claims 1-4 and 6-38 Under §112, first paragraph*

Claims 1-4 and 6-38 were rejected under 35 U.S.C. §112, first paragraph, as being non-enabling for the electrolyte membrane being generically gas permeable. Applicants have amended the claims to recite that the claimed membrane evolves carbon dioxide gas. Withdrawal of this rejection is now respectfully requested.

### *Rejection of Claims 9 and 14 Under §112, Second Paragraph*

Claims 9 and 14 were rejected under 35 U.S.C. §112, Second Paragraph for the informalities noted on pages 3 and 4 of the Office Action. Since Applicants have canceled both claims 9 and 14, this rejection is now moot. Accordingly, withdrawal of this rejection is now respectfully requested.

*Prior Art Rejections*

Each of the pending claims have been rejected as being either anticipated under 35 U.S.C. §102, or obvious under 35 U.S.C. §103, in view one or more of the following references:

U.S. patent no. 5,085,950 (Primdahl);  
U.S. patent no. 6,465,136 (Fenton);  
PCT Published application no. WO 97/19480A  
U.S. patent no. 5,525,436 (Savinell);  
JP 11-086630-A ("JP '630");  
U.S. patent no. 5,176,996 (Epp);  
U.S. patent no. 5,573,162 (Van Dine);  
U.S. patent no. 5,798,186 (Fletcher);  
U.S. patent no. 4,248,682 (Linstrom); and  
U.S. patent no. 5,945,231 (Narayanan).

For the following reasons, the claimed invention is patentable over the cited prior art.

The Claimed Invention

Claim 1 is directed to a membrane electrolyte for a fuel cell comprising a first material for conducting protons from an anode chamber of a fuel cell, to a cathode chamber of the fuel cell. The membrane also comprises a second material organized and arranged in one or more predetermined locations in the first material for conducting carbon dioxide gas from the anode chamber to the cathode chamber. Independent claims 25, 33-35 and 38 recite the same patentable features.

It is a feature of the claimed invention, that the membrane electrolyte evolves anodically generated carbon dioxide from the anode chamber to the cathode chamber. Specifically, the membrane electrolyte includes a first material for conducting protons from an anode chamber of the fuel cell to the cathode chamber of the fuel cell and a second material organized and

arranged in one or more *homogeneous fields* in *predetermined locations* through the first material for conducting carbon dioxide gas from the anode chamber to the cathode chamber.

#### The Prior Art Cited Against the Independent Claims

As understood by Applicants, Primdahl disclose a fuel cell having an electrolyte membrane sandwiched between an anode electrode sheet and a cathode electrode sheet. The anode and cathode sheets include a number of parallel channels comprising inlet channels and outlet channels for corresponding reactant and exhaust gases, which allow for a reduced distance gaseous reactants have to pass over electrode sheets.

As also understood by Applicants, Fenton discloses a composite membrane structure which includes a composite membrane and at least one protective layer disposed adjacent to the composite membrane. The composite membrane includes a porous polymeric matrix intermixed with an ionically conductive solid, noble metal or a combination thereof, and a binding material (binder).

Epp is understood to disclose a membrane electrode and seal assembly, which includes a first and second layer of porous electrically conductive sheet material, and a solid polymer ion exchange membrane interposed therebetween. The layers of sheet material and membrane are bonded together to form a consolidated assembly. Openings are formed in the layers of sheet material and the membrane to accommodate the passage of fluids through the assembly. Seals are formed by impregnating the layers of sheet material with a sealant material which generally circumscribes the fluid passage openings and the electrochemically active portion of the assembly.

Narayanan et al. appears to have to be directed to a direct liquid-feed fuel cell including a solid membrane electrolyte. Narayanan et al. has been cited as a reference for disclosing general fuel cell components (e.g., housing, anode and cathode chamber). See Office Action, page 16.

### Analysis

In order for a claim to be anticipated by a prior art reference, it must disclose each and every feature recited in the claims. A claim may be obvious over a prior art reference if the feature not disclosed in the reference is of common knowledge in the art, or can be found in another prior art reference. However, in order for a claim to be obvious in view of two or more references, there must be some teaching or suggestion in the two or more references to combine the elements to arrive at the claimed invention.

After a thorough review of the cited prior art, Applicants could find nothing in any of the cited references which either disclose, teach or suggest a membrane electrolyte for a fuel cell which evolves carbon dioxide gas from an anode chamber to a cathode chamber via a second gas evolving material organized and arranged in one or more homogeneous fields in predetermined locations in a first proton conducting material.

The Action alleges that the channels of Primdahl disclose the recited “second material” of the claimed invention for conducting gas from one side of the membrane to the other. Applicants respectfully disagree. The channels in Primdahl are empty areas, thus, they cannot be said to contain any material, much less the second carbon dioxide gas evolving second material as claimed.

The Action also alleges that the proton conducting material and a second porous material in Fenton are “separate and distinct from each other” and thus anticipate the claims. Moreover, the Action also alleges that since the two materials (allegedly) are separate and distinct from one another, they therefore constitute first and second fields. Applicants respectfully disagree on both findings for two reasons. First, Applicants respectfully submit that there is simply no disclosure in Fenton, or even any teaching or suggestion that the porous material disclosed therein conducts carbon dioxide gas from an anode chamber to a cathode chamber of a fuel cell when used therein. Applicants imagine the Action is attempting to rely on the notion that porous materials conduct gases. This generalization cannot be applied to Fenton and is an incorrect assumption, as some porous materials do not conduct gas.

Second, even assuming *arguendo*, that the porous material of Fenton could conduct a gas (which is not the case), it cannot do so since the porous material disclosed in Fenton is used as a matrix material for holding a binder and an ionically conductive solid. Applicants cannot understand how such a combination of materials can be compared or equated to *homogeneous fields* of a gas-evolving material in predetermined locations in a proton conducting material as presently claimed, since the other components disclosed in Fenton are interspersed (i.e., mixed) throughout the matrix material. Actually, the Action admits to the two materials disclosed in Fenton being “blended into a single layer”, however incorrectly applies this notion to the claimed invention of the subject application. Moreover, the Action relied on “blending” to anticipate claim 18. However, claim 18 relates to *combining* the materials into a single layer, not “blending” them together.

The remainder of the prior art references cited in the Action, as well as the prior art of record fails to meet the deficiencies of Primdahl and Fenton. Accordingly, for at least the above reasons, claims 1, 25, 33-35 and 38, and each of their respective corresponding dependent claims, are patentable over the cited prior art.

#### CONCLUSION

In view of the foregoing remarks, Applicants submit that all the issues raised in the outstanding Action have all been addressed. Accordingly, Applicants respectfully request favorable reconsideration and early passage to issue of the present application.

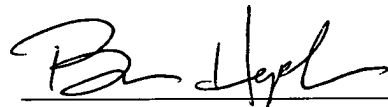
Applicants respectfully requests that should the Examiner have additional concerns and reasons for unpatentability, **that the Examiner contact Applicants’ appointed representatives to discuss the issues.** To that end, Applicants respectfully request that the Examiner contact the undersigned attorney when he is ready to re-examine the subject application so that Applicants representatives may prepare to discuss the subject application with the Examiner.

No fee is currently due for the present response, save for the fee for extending the time for response. However, in the event that it is determined that additional fees are due, the Commissioner is hereby authorized to charge the undersigned's Deposit Account No. 50-0311.

Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 935-3000. All correspondence should continue to be directed to our address given below.

Date: January 20, 2005

Respectfully submitted,



Brian P. Hopkins, Reg. No. 42,669  
Attorneys for Applicants

Mintz Levin Cohn Ferris  
Glovsky & Popeo, P.C.  
Chrysler Center  
666 Third Avenue, 24<sup>th</sup> Floor  
New York, New York 10017  
Tel: (212) 935-3000  
Fax: (212) 983-3115